EASA European Union Aviation Safety Agency	**Special Condition**	Doc. No. : **SC-CVLA-div01-02** Issue : 2 Date : 02 Sept 2019 Proposed ☐ Final ☒

SUBJECT	:	**Issue 2 of SC to CS-VLA for Aeroplanes with Maximum Take Off Mass more than 750 kg**
REQUIREMENTS incl. Amdt.	:	**CS VLA amdt 1**
ASSOCIATED IM/AMC	:	Yes☒ / No ☐
ADVISORY MATERIAL	:	**AMC to SC-CVLA–div01-02**

INTRODUCTORY NOTE:

The following Equivalent Safety Finding has been classified as important and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

IDENTIFICATION OF ISSUE:

The applicability of CS-VLA is limited to aeroplanes with maximum take-off mass (MTOM) of not more than 750 Kg. In accordance with 21A.16B, this Special Condition establishes additional requirements for aeroplanes with MTOM up to 850 Kg.

The CS-VLA is based on CS-23 small aircraft requirement. It intended to authorise certification of aircraft with a simpler design than the CS-23 and lighter weight. The MTOM of 750 Kg and the limit of 45 kts of stall speed in landing configuration are established so that aeroplanes meeting such criteria would have a lower energy at impact so that they do not need to meet the crashworthiness requirement (as in CS 23 through the CS 23.562).

The first issue of this special condition was published in May 2018, after public consultation (https://www.easa.europa.eu/document-library/product-certification-consultations/proposed-special-condition-cs-vla-aeroplanes).

The present is a proposal for a revision of that special condition to account for a higher limit of the allowable stall speed in landing configuration. A higher stall speed means higher energy to be absorbed by the aircraft structure and systems in a survivable crash.

The performance-based crashworthiness requirements included in SC-CVLA.03 (b) and (c) of the first issue of the special conditions are considered generic enough to cover the higher risk linked with an increment of stall speed of ca. 10% (50 kts).

In addition, more specific acceptable means of compliance are introduced in this second issue to account for the higher impact energy.

Considering all the above, the following amendments to the Special Condition are proposed. Only comments to revised parts will be taken into account.

(1) SC-CVLA.01 becomes SC-CVLA.01 (a) and is modified as follows:

(a) In addition to CS-VLA.1 the following applies:
If the Maximum Certificated Take Off Mass is higher than 750 Kg, but anyway less than 850 Kg, the requirements in this Special Condition apply.

(2) In SC-CVLA.01 the following point (b) is added:

(b) In addition to CS-VLA.49 the following applies:
If the stall speed in landing configuration is higher than 45 kts, but anyway less than 50 kts (CAS), the requirements in this Special Condition apply

(3) The following point is added:

SC-CVLA.06

The rotation speed V_R, is the speed at which the pilot makes a control input with the intention of lifting the aeroplane out of contact with the runway.
V_R, must not be less than V_{S1}.
The Aeroplane Flight Manual shall provide the rotation speed established above for normal take-off procedures.

(4) In AMC-SC-CVLA.03 (a) the following text is added

Safety belt attachment point locations shall be optimised in accordance with FAA AC21-34 "Shoulder harness – safety belt installations". The arrangement of the safety harness installation should minimise the probability of the occupant's body from either sliding underneath the belts or sliding laterally when subjected to inertia loads acting in the forward or sideward direction, respectively. For semi-reclined seating positions, the anchorage points of the lap belt should be located well below and behind the H-Point at an angle between 80 ± 10 degrees to the datum line through the H-Point parallel to the longitudinal axis of the aeroplane.

(5) In AMC-SC-CVLA.03 (b) the following text is added

The elongation experienced by lap belts and shoulder harnesses under 18g forward static load prescribed in SC-CVLA.03 (e) shall be estimated and accounted for in the evaluation of the head strike path.

(6) AMC-SC-CVLA.03 (c) is modified as follows

An energy absorbing device (e.g. seat cushion made of energy absorbing foam, honeycomb, etc.) proven to minimize injuries and lumbar loads (ref. CS-23.562 (c)(7) for conditions to be considered) can be accepted as means of compliance to the subject paragraph. Experience shows that a minimum of 5 cm of absorption thickness should be provided.

For ease of reading, a consolidated version of the amended special condition is here reported.

SPECIAL CONDITION SC-CVLA-div01-02

CS-VLA Aeroplanes with MTOM of more than 750 Kg

SC-CVLA.01 (a)

In addition to CS-VLA.1 the following applies:
If the Maximum Certificated Take Off Mass is higher than 750 Kg, but anyway less than 850 Kg, the requirements in this Special Condition apply.

SC-CVLA.01 (b)

In addition to CS-VLA.49 the following applies:
If the stall speed in landing configuration is higher than 45 kts, but anyway less than 50 kts (CAS), the requirements in this Special Condition apply

SC-CVLA.02 (see AMC SC-CVLA.02)

The maximum horizontal distance travelled in still air, in km per 1000 m (nautical miles per 1000 ft) of altitude lost in a glide, and the speed necessary to achieve this, must be determined with the engine inoperative and its propeller in the minimum drag position, landing gear and wing flaps in the most favourable available position.

SC-CVLA.03 (see AMC SC-CVLA.03 (a), (b) and (c))

In addition to CS-VLA.561, the following applies:

(a) Each seat is to be equipped with at least a 4-point harness system;

(b) The applicant shall evaluate the head strike path with validated methods, and minimise the risk of injury in case of a head contact with the aircraft structure or interior.

(c) The design shall provide reasonable precautions to minimize the lumbar compression loads experienced by occupants in survivable crash landings;

(d) Each seat/harness system shall be statically tested to an ultimate inertia load factor of 18g forward, considering an occupant's mass of 77 Kg. The lapbelt should react 60 percent of this load, and the upper torso restraint should react 40 percent of this load.

(e) In place of CS-VLA 561 (c) the following applies:
Each item of mass within the cabin that could injure an occupant if it came loose must be designed for the Ultimate inertia load factors:
i. Upward, 3·0g;
ii. Forward, 18·0g; and
iii. Sideward, 4·5g.

Engine mount and supporting structure are included in the above analysis if they are installed behind and above the seating compartment.

SC-CVLA.04

Instead of CS-VLA.787 (e) the following applies:

If there is no structure between baggage and occupant compartments the baggage items located behind the occupants and those which might become a hazard in a crash must be secured for 1·33 x 18 g.

SC-CVLA.05

In addition to CS-VLA 1587 (a) the following applies:
(6) the glide performance determined under SC-CVLA.02

SC-CVLA.06

The rotation speed V_R, is the speed at which the pilot makes a control input with the intention of lifting the aeroplane out of contact with the runway.
V_R, must not be less than V_{S1}.
The Aeroplane Flight Manual shall provide the rotation speed established above for normal take-off procedures.

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AMC-SC-CVLA.02

Background. The primary purpose of this information is to provide the pilot with the aeroplane gliding performance. Such data will be used as an approximate guide to the gliding range that can be achieved, but will not be used to the same degree of accuracy or commercial significance as many other aspects of performance information. Hence some reasonable approximation in its derivation is acceptable.

Means of compliance
(1) Engine-Inoperative
Tests. Clearly the simplest way of obtaining accurate data is to perform actual engine-inoperative glides. These tests should be carried out over an airfield, thereby permitting a safe landing to be made in the event of the engine not restarting at the end of the test.
(i) Fixed Pitch Propeller. Most likely, the propeller will be windmilling after the fuel is shutoff. If this is the case and the propeller does not stop after slowing to the best glide speed, then the gliding performance should be based on a windmilling propeller. Stalling the aeroplane to stop the propeller from windmilling is not an acceptable method of determining performance because the procedure could cause the average pilot to divert attention away from the primary flight task of gliding to a safe landing.
(ii) Constant-speed/ Variable-pitch propeller aeroplanes. For these propellers, the applicant may assume that the means to change propeller pitch is still operational and therefore the propeller should be set at the minimum drag configuration. For most installations this will be coarse pitch or feather.
(2) Sawtooth Glides. If Sawtooth Glides are used to determine the glide performance, these glides can be flown using the same basic procedures in paragraph 23.65 of the guidance material in CS 23 Book 2. For simplification, the test need only be flown at an intermediate altitude and gross weight generating one speed for the pilot to use. The best lift over drag speed is frequently higher than the best rate of climb speed; therefore, the airspeed range to flight test may be bracketed around a speed 10 to 15% higher than the best rate of climb speed.
(3) Performance Data. A chart or table should be constructed for the AFM that presents the literal (over-the-ground) gliding distances for the altitude range expected in service, at the demonstrated glide speed. As a minimum, a statement of NMs per 305 m (1 000 ft) loss of altitude at the demonstrated configuration and speed at MTOW, standard day, no wind, has to be given.

AMC-SC-CVLA.03 (a)

A 4-point harness is consisting of two lap belt straps and two shoulder straps. The shoulder straps may be attached to one point to the structure.
Safety belt attachment point locations shall be optimised in accordance with FAA AC21-34 “Shoulder harness – safety belt installations”. The arrangement of the safety harness installation should minimise the probability of the occupant’s body from either sliding underneath the belts or sliding laterally when subjected to inertia loads acting in the forward or sideward direction, respectively. For semi-reclined seating positions, the anchorage points of the lap belt should be located well below and behind the H-Point at an angle between 80 ± 10 degrees to the datum line through the H-Point parallel to the longitudinal axis of the aeroplane.

AMC-SC-CVLA.03 (b)

The following method is accepted as means of compliance to the subject paragraph (ref. *FAA AC No. 23-11B)*:

(1) The head strike path can be conservatively determined from actual test data, specifically, “Airplane Crash Survival Design Guide, Volume 1 – Design Criteria and Checklists,” report number USAAVSCOM TR 89-D-22A.

(2) The applicant should overlay the flail envelope from figure 43 of this document with the cockpit of the airplane.
(3) The overlay of the head strike path with the cockpit shows that a head strike will not occur.

The elongation experienced by lap belts and shoulder harnesses under 18g forward static load prescribed in SC-CVLA.03 (e) shall be estimated and accounted for in the evaluation of the head strike path.

AMC-SC-CVLA.03 (c)

An energy absorbing device (e.g. seat cushion made of energy absorbing foam, honeycomb, etc.) proven to minimize injuries and lumbar loads (ref. CS-23.562 (c) (7)) can be accepted as means of compliance to the subject paragraph. Experience shows that a minimum of 5 cm absorption thickness should be provided.